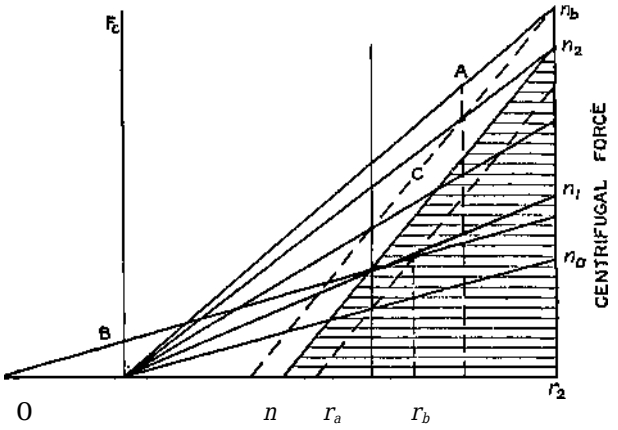
speed to remain constant. For the weights to move outward, it would then be necessary for the speed of revolution to increase, and there would be a definite position of the balls corresponding to each speed throughout the range. The governor would then be stable.

Fig. 43 shows these relations. The radius of the centre of gravity of the weights is set down on the horizontal axis, and the centripetal or inward controlling forces, exerted by the springs upon the weights, are marked on the vertical axis.

Let us assume that the line OF_C coincides with the axis of the governor, and that the lines A radiating from the origin O show on the same scale as F_c the centrifugal forces generated in the balls at different speeds and varying radii. Each of these inclined lines corresponds to a definite speed, and



VARYING RADII OF CENTRE OF GRAVITY OF WEIGHT

Fig. 43

the higher the speed the greater their slope. The centrifugal forces vary, of course, directly with the radius for any given speed of revolution. If the springs were so fixed that at the point O—that is, at the centre of the governor spindle—their pull was zero, then the balls could take up any position on any given line so long as the speed remained constant, and the governor would be in a condition of neutral equilibrium, or isochronous. Assume the engine to be standing, and the balls under the tension of the springs resting upon a stop with their centre of gravity at radius r_x. On the engine being started, the balls would remain on the stop until the

centrifugal force was equal to the pull of the springs in that position, but immediately the speed increased, no matter by how little, the balls would move outwards throughout their range, cutting off the steam completely. The speed of the engine would then decrease, and the balls would commence to return to their inner position and full steam would be given to the engine. Or the balls might rest somewhere between their extreme positions for a little while, only to move away by an indefinite amount as soon as the load varied and the speed of the engine altered.

Assume now that other springs were substituted, having their position